Optimization of growth and immobilization of *Rhodopseudomonas palustris* strain B1 for the utilization of sago starch processing wastewater

by

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ABSTRACT

An indigenous strain of the purple non-sulphur phototrophic bacterium, *Rhodopseudomonas palustris* strain B1 was optimized for growth and then immobilized in 4% (w/v) agar for the treatment of sago effluent.

Growth of *R. palustris* strain B1 was optimized in synthetic medium with starch as the primary electron donor. The optimal conditions for cultivation were at pH 7, temperature 25 ^{o}C, light intensity of 5 klux with a 5% 48 h old inoculum. Under these optimal conditions, maximum biomass of 8.1 g/L was obtained after 72 h under anaerobic-light culture conditions.

Immobilization of the cells with 4% agar was favoured over alginate and carrageenan. Entrapment with agar gave solid beads that were rigid and uniform in size. There was a 82% reduction in the Chemical Oxygen Demand (COD) of the sago effluent after 4 days of treatment under anaerobic-light conditions.

Further investigations showed that mixing and inoculum size did not significantly affect the COD removal. However, the immobilized cells retained 89% of their activity after the third consecutive recycling and 58% after the fifth consecutive recycling of fresh batches of sago effluent under anaerobic-light conditions.

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LIST OF ABBREVIATIONS

%	percentage
µg	microgram
µL	microliter
v/v	volume per volume
w/v	weight per volume
Abs	Absorbance
ANOVA	Analysis of variance
ADP	Adenosine DiPhosphate
ATCC	American Type Culture Collection
ATP	Adenosine TriPhosphate
BSA	Bovine Serum Albumine
COD	Chemical Oxygen Demand
DNA	Deoxyribonucleic Acid
FAS	Ferrous Ammonium Sulfate
fig.	figure
g	gram
GM	Glutamate-malate
h	hour
HSD	honestly significant difference
kg	kilogram
klux	kilolux
L	Litre
M	Molarity
m	metre
mg	milligram
min	minute
mL	milliliter
nm	nanometer
OD	optical density

PABA	*p*- aminobenzoic acid
PNB	Purple Non-sulphur Phototrophic Bacteria
rpm	revolution per minute
SCP	Single Cell Protein
W	Watt
wt	weight